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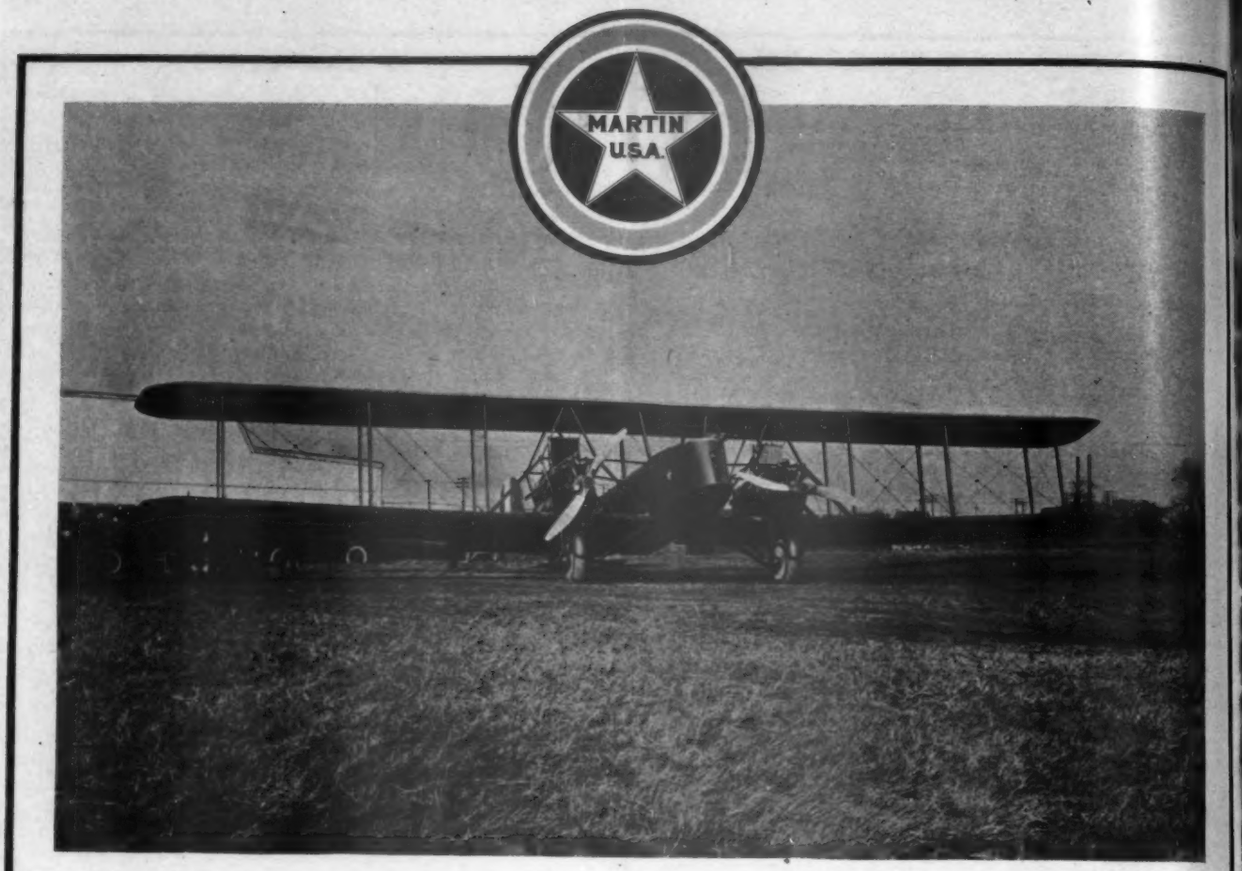

Quality Depends on Environment

A few years ago an Armenian brought to this country some seeds of the fine-leaved tobacco grown in Turkey which had a reputation for being rare and of very fine quality.

He planted them with great care in soil and under a sky which seemed to him precisely like those of their native home.

When the plants came up and grew to maturity, he found that he had a coarse valueless product which developed a leaf as big and as rough as a "Connecticut wrapper."

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Airships as Airplane Carriers

IN the early days of aeronautical development it was repeatedly suggested to combine the features of airships and airplanes in a composite type which would, in theory at any rate, partake of the advantages of both types and have none of their respective shortcomings. The airship can carry heavy loads over great distances at moderate speeds; the airplane, on the other hand, can carry relatively small loads over rather short distances at the highest speed any vehicle is capable of attaining. Hence it was but natural that attempts should have been made in the past to combine the two types.

The difficulty in doing this has been that in combining the advantages the drawbacks, too, were combined, with no real improvement on either of the fundamental types, because their characteristics were so widely divergent.

By constructing an airship to carry airplanes as separate units, there would seem to be a much better chance of success. In this case each type would retain its technical individuality, and can thus be efficiently designed for its own sphere of work. The idea of the carrier airship is fundamentally sound, but it involves the solution of some important problems before it can become a reality.

The mechanical details of releasing airplanes from aboard airships, although presenting some novel engineering problems, need not offer serious difficulties. The one really important problem is that of ballast. Many persons apparently assume that weight can be unloaded and loaded on an airship as easily as on a steamship. But a steamship automatically displaces its own weight of water because it floats on the surface, whereas an airship is entirely immersed in the fluid in which it floats. In the latter case there are only three possible methods of maintaining vertical equilibrium, namely: changing the load (as by ballast); changing the temperature, pressure or quantity of gas; and using aerodynamic reactions.

The last method alone is usually ample for taking care of ordinary changes in weight or buoyancy except that due to fuel consumption on a long trip. It is mainly for this latter purpose that various ballast recovery systems are being developed. But all present methods seem to break down when analyzed with respect to counterbalancing the release of a whole squadron of airplanes at once. The *release* can, of course, be handled by letting out gas, but this precludes the possibility of taking the machines on again, because there is no feasible method known of storing or generating gas on board.

But why take the planes on and off at all except for refuelling, repairs and other special purposes? The carrier airship would then be not so much a carrier of airplanes as of fuel, tools, spare parts, ammunition and relief pilots. Such an airship could carry supplies for about five times as many airplanes as it could actually accommodate on board.

For naval purposes a further development suggests itself. If the combination of airplanes and airships is good, that of airplanes, airships *and steamships* should still be better. The steamship is unquestionably the most efficient and economical unit for the mere transporting of loads. But the airship furnishes a more mobile and satisfactory base for many tactical operations.

The airplanes must, of course, do most of the actual fighting, reporting back at frequent intervals to the airship, which in turn will have no trouble in replenishing itself occasionally from the steamship. In fact there may be several airships, each with its airplanes, operating from the one steamship.

The term "aircraft carrier" then broadens in scope to ships of the air as well as ships of the sea. While much of the work along such lines is hidden behind the veil of official reticence, a general discussion of its feasibility should only stimulate activity in both lighter-than-air and heavier-than-air development.

China's Contribution

WHEN complete reports are available with regard to the air attack on the Chinese fleet and its subsequent capture by one of the warring factions, a new chapter will have been written in the history of aerial warfare. While the forces engaged may have been relatively unimportant when compared with the battleships and aircraft of Western powers, the principle of the attack is one of the newest developments in tactics.

All military and naval experts predict that the initial contact in a war between first class fighting powers will occur in the air. Many also predict that the advantage gained by the first air victory will be a dominating factor in the first stages, if not in the actual outcome, of any conflict. This will naturally depend on the aeronautical equipment of the combatants at the outbreak of hostilities.

It is just in this respect that the United States is deficient. It appears to be impossible to impress Congress with the necessity of providing sufficient aeronautical equipment in peace time to make preparedness for a war emergency more than a theory. Even were the equipment available, the personnel is lacking.

Now it is obvious that if a country has the best aircraft in the world, but lacks the necessary personnel to operate it, the maximum striking force it should be able to exert will not be available.

If the lesson from the civil war in China impresses the world, as it should, with the ever growing importance of air power and the need of aerial preparedness China will have again contributed to the progress of mankind.

Aeronautical Standardization

Standardization of Materials, Parts and Tools Desirable for Mass Production in Emergencies

The following suggestions in regard to aeronautical standardization have been contributed to AVIATION *by two aeronautical engineers who possess beside theoretical knowledge of the subject a large amount of factory experience. Their suggestions will therefore be read with much interest.*—EDITOR.

Standardization is of paramount importance in the aeronautical field today. The present is the greatest era of development the airplane has known for diversified types and usages, both military and commercial. It is the experimental age, as well as the period when we must get down to brass tacks, and exhaust every effort to make it the efficient age.

What is, therefore, more logical and consistent than that in such a period of development standardization of materials, finished parts, commercial parts, tools, and designs should be utilized to the greatest possible extent so that the most successful types of airplanes developed may be most readily put into production. If a national emergency should then arise aircraft and all other allied manufacturers would then be equipped for effective and immediate cooperation in quantity production of whatever types of airplanes are most desired to meet that emergency. No matter how distant the storm clouds might be, at the first warning we could begin to turn out our standardized products, secure in the knowledge that if the storm did head our way we would be prepared to begin the construction of the most effective protection against that storm from products already at hand.

It is with this thought in mind that the recommendations made in this article are given. They are not offered as a complete solution to the problem, but rather as a foundation on which to begin building the cooperative standardization the aircraft industry must and will have.

To apply standardization to the raw materials from which aircraft parts are manufactured is, perhaps, the most difficult task of all, and yet, when properly accomplished, will yield the greatest benefits in return. Undoubtedly no aircraft manufacturing organization exists which has not done considerable work in the standardization of materials within its own concern, but not until we have complete cooperative standardization of materials will it be possible to reap all the benefits and economies that will surely result from this undertaking. Every manufacturer at some time or other has found it wellnigh impossible to obtain sufficient quantities of raw material to successfully launch an experimental plane into production without changing the design of details so that they could be made from some other material than that originally decided upon. If we, however, can establish a successful standard it will pay both the aircraft manufacturer and the material manufacturer to stock this standard material in quantities sufficient to meet the ordinary needs of the industry.

In order to illustrate some of the possibilities in the standardization of materials each material will be treated separately, and certain recommendations offered in each instance.

Steel

Despite the increasing use of aluminum and its alloys in aircraft structure steel is the permanent material for the construction of aircraft fittings. Steel is used primarily in three forms—sheet, rod or bar, and tubing—and to a much smaller extent in forgings. The very keynote of steel standardization is to have the chemical composition and physical properties the same in all of its four forms. The very first consideration therefore, is to determine what physical properties, of which tensile strength may be taken as the index, are desirable, and how many sets or groups of physical properties are desired to be standard.

For the most effective standardization it is felt we may confine our sets or groups to two general classes. One of these should be a carbon steel having a tensile strength of 55,000 to 70,000 lb. per square inch and the other an alloy steel with a tensile strength of 125,000 to 150,000 lb. per square inch.

It is assumed that these steels will be amply covered by detailed specifications, but above all they should be definitely specified by chemical composition. This can be most effectively done by the use of the steel number designation of the Society of Automotive Engineers (hereafter called the SAE). This steel number is universally recognized by steel manufacturers. For example, steel number 1025 or 1030 may be regarded as having a satisfactory chemical composition to develop the physical properties required of our standard carbon steel. In like manner, steel number 6125, which is a chrome vanadium alloy, or steel number 2325, which is a nickel steel alloy, would be acceptable types of alloy steels.

Having determined the physical properties desirable, and the chemical composition suitable, we must standardize on a method of heat treatment which will yield the required physical properties from the steels selected. It is in heat treating that we attain one of the paramount advantages in having our four forms of standard steel all of the same chemical composition. When we weld a piece of tubing to a part made of sheet stock for example, and then apply our standard heat treatment, we know definitely what the physical properties of the assembled piece will be. As both tubing and sheet have the same chemical composition the assembled piece must have the same physical properties as its component parts would have if heat treated separately. If, however, the tubing were of a chemical composition different from the sheet so that each would require a different heat treatment to develop the same strength, the application of the heat treatment devised for the tubing to the assembled piece after welding would still leave us very much in doubt as to what strength was developed in the sheet member of the assembled piece. This is only natural because we cannot expect to develop the maximum strength of the sheet by the use of a heat treatment not at all evolved for its chemical composition. So we will need only two methods of heat treatment, one for the carbon steel and one for the alloy steel, with a definite knowledge of the physical properties resulting in each instance.

Standard Sizes

The determination of standard sizes and the method of designating these sizes will be our next step. Sheet steel may best be specified for thickness by Birmingham Wire Gauge (BWG) for all thicknesses up to No. 16 BWG (0.065 in.), above which size the fractional parts of an inch may best be used. In all cases the decimal equivalent should be used in conjunction with the other method of designation. The use of even gage numbers is recommended, with the caution that the carbon steel at least should be selected with the object of fitting the gaps of turnbuckles, shackles, etc. which will be taken up later in this article. As a typical selection of sheet sizes the following are offered: No. 20 (0.035 in.) BWG, No. 18 (0.049 in.) BWG, No. 16 (0.065 in.) BWG, 1/10 (0.100 in.), ⅛ (0.125 in.) , 3/16 (0.188 in.), and ¼ (0.250 in). Tolerance should be in accordance with best manufacturing practice in this and all future sizes of material selected.

Steel tubing should also be specified by Birmingham Wire Gauge for wall thickness, and outside diameter in fractions of an inch for size. For typical standards, outside diameters may vary by eights of an inch from ¼ to 2 in., and thence by quarters of an inch to 3 in. It is to be expected that instances will arise in which it may be necessary to deviate from these recommendations, but it is believed that they will be comparatively rare. The selection of gages in which these various diameters will be required is, of course, dependent of the size and type of aircraft to be manufactured. Generally speaking,

No. 20 (0.035 in.) BWG and No. 18 (0.049 in.) BWG for the smaller sizes are practical, while No. 16 (0.065 in. BWG and possibly No. 11 (0.120 in.) BWG are suitable for the larger sizes. For use in telescoping tubes, and for bearings on bolts No. 17 (0.058 in.) BWG should be used. For example a ¼ in. outside diameter tube will telescope into a ⅜ in. outside diameter No. 17 (0.058 in.) BWG tube. It is not deemed necessary for each manufacturer to stock all of the gages recommended in each of the diameters given as the determination of which to stock is a matter based on the past experience of the individual manufacturer, and, as previously mentioned, on the type and size of aircraft desired. The use of seamless steel tubing in preference to welded steel tubing is recommended.

Steel rod or bar should be carried in two shapes, round and hexagonal. It should be specified in fractions of an inch diameter for round bars, and by fractions of an inch distance across flats for the hexagonal. The sizes of each shape to be regarded as standard is dependent largely on whether the manufacturer plans to make his own bolts and nuts, and if so whether he machines them out of hexagonal stock or uses round stock with a bolt heading machine. It will be assumed that the average manufacturer purchases his bolts and nuts and so requires a stock of rod and bar for general purposes only. The sizes recommended for round stock are 3/16 in., ¼ in., 5/16 in., ⅜ in., ½ in., ⅝ in., ¾ in., ⅞ in., and 1 in. diameters. Hexagonal stock of the following sizes should prove ample 7/16 in., ½ in., 9/16 in., ⅝ in., 11/16 in., ¾ in., ⅞ in., and 1 in.

The use of steel forgings is on the wane, and as the average manufacturer does not possess the facilities for drop forging, it is assumed that this work will be done for him by an outside concern in the instances where a forging is required. Therefore no attempt will be made to recommend sizes of material for this purpose. However the general assortment of rod and bar will take care of his needs for forgings in most cases.

Aluminum

Aluminum, or one of its alloys (the principal one of which is duralumin), provides an ideal alternative for steel in an ever increasing number of instances. Though the all-metal plane, constructed of an aluminum alloy, is an accomplished fact it has not as yet been advanced to the stage where it may be regarded as standard practice. Aluminum for tank construction, cowling, radiator shutters, and all parts where great strength is not required is good standard practice. Aluminum, or one of its alloys, is finding increasing use for wing construction, pontoons, piping, and similar functions. Aluminum in the form of sheet, rod, or tube should be approximately 98 per cent pure. Sheet and rod should develop a tensile strength of about 12,000 lb. per square inch in the soft annealed condition and about 18,000 lb. per square inch in the half hard form. Tubing should develop about 22,000 lb. per square inch in tension. For general casting an aluminum alloy having a chemical composition of from 7 per cent to 9 per cent copper, a maximum of impurities of 2 per cent, with the remainder consisting of pure aluminum, and developing a tensile strength of 18,000 lb. per square inch, will be found satisfactory. Whenever possible the use of machined aluminum rod is recommended in preference to cast aluminum. Aluminum may be readily welded, and the result will be satisfactory. Soldering, while possible, is not to be recommended as the solder itself corrodes too rapidly under use.

Aluminum sheet should be specified for thickness in terms of Browne and Sharpe gage. The sizes best adapted for standard use are No. 20 (0.032 in.) B&SG, No. 18 (0.040 in.) B&SG, No. 16 (0.051 in.) B&SG, and No. 14 (0.064 in.) B&SG.

Aluminum rod should be specified in fractions of an inch for diameter. The sizes most likely to be used are ⅛, ¼, ⅜, ½, ¾, and 1 in. If the practice of machining parts from aluminum rod instead of casting is followed, larger sizes will be required.

Aluminum tubing should be specified in terms of Browne and Sharpe gage for wall thickness, and fractions of an inch for outside diameter. For general purposes and for piping No. 20 (0.32 in.) B&SG will be found a satisfactory thickness. The diameters best suited for general purposes are ¼, ½, ⅝, ¾, and 1 in. If used for gasoline and oil piping sixteenth sizes would have to be introduced.

Duralumin, which has many peculiar characteristics and is dependent upon successful heat treatment for its strength, requires very expert knowledge to be used with good results, and in its present stage of development cannot be considered a standard for heavier-than-air work.

Copper

For tubing used in gasoline and oil lines copper is still the principal material. Though still used for tank construction, and as a protection to wood parts where metal fittings are attached, its use in this manner is rapidly decreasing. As an outside protection to hulls and pontoons at certain vital points it is very effective. It is also used for many minor purposes.

The copper used for both sheet and tubing should be at least 99.5 per cent pure.

The thickness of copper sheet should be given in ounces (weight in ounces per square foot of surface) with the decimal equivalent in inches given in each case. The sizes most likely to be used are 10 oz. (0.13 in.), 14 oz. (0.018 in.), 18 oz. (0.024 in.), and 24 oz. (0.032 in.).

The thickness of copper tubing should be specified in terms of Birmingham Wire Gage, and the outside diameter in fractions of an inch. For general gasoline and oil piping No. 18 (0.035 in.) BWG will prove a good selection. The diameters used should range by sixteenths of an inch from ⅛ to ⅝ in., and then by eighths to 1 in.

Brass

The ideal material for pipe fittings of the soldered or compression type to use in conjunction with copper tubing is brass. Present practice is to use commercial brass pipe fittings, and while this gives a satisfactory fitting it is decidedly defective in one respect, namely the excessive weight. The SAE pipe fittings are better in this respect, but even they are not ideal. Since these pipe fittings are constructed to withstand certain pressures which they are subjected to in commercial practice in other fields, the decreasing use of pressure systems in aircraft makes it imperative to develop a special lighter design of pipe fittings for standard aircraft use. It is, however, quite probable that with the increasing use of aluminum tubing, and with the development of our ability to cast and thread the various alloys of aluminum, that the future standard pipe fitting will be of the SAE flared, non-soldered type made from one of the alloys of aluminum. Since brass is used for these fittings at present it will be considered standard.

Brass sheet where used will be found satisfactory if it has the following chemical composition: copper 59 to 63 per cent; tin 0.5 to 1.5 per cent; iron (maximum) per cent 0.06; lead (maximum) per cent 0.02. This will give a brass of about 55,000 lb. per square inch tensile strength. The thickness of sheet brass should be specified in Browne and Sharpe gage. A sufficient range of thicknesses will be given by No. 20 (0.032 in.) B&SG, No. 18 (0.040 in.) B&SG, No. 16 (0.051 in.) B&SG, and No. 14 (0.064 in.) B&SG.

For general castings gun metal which has a tensile strength of about 30,000 lb. per square inch should be used. The chemical composition should be about as follows: copper 87 to 89 per cent; tin 9 to 11 per cent; zinc 1 to 3 per cent; iron (maximum) 0.06 per cent; lead (maximum) 0.02 per cent. Where great strength is essential a manganese bronze casting may be used.

Wood

To undertake the standardization of wood used in aircraft construction is not considered beneficial. However, to formulate definite specifications and classifications for each species would be advantageous providing we did not try to eliminate any of the inferior woods which might have a possible use. Due to the fact that the various species of wood are not available in unlimited quantities it would entail a serious inroad on the future supply if every manufacturer were to use only the best species available for each type of construction. Therefore, the diversified use of inferior woods is to be encouraged wherever practicable.

Plywood

The extensive use of plywood in wing construction, hulls, pontoons, fuselages, and in fact wherever a thin section of wood of great strength is desirable, has made it an important factor in the production of aircraft. Plywood may be standardized with respect to thickness and number of plies of veneer to make up the given thickness. Standardization with respect to species is more questionable in the anticipated benefits. The following range of sizes will provide a good basis for standardization:

Size (in.)	No. of ply	Thickness of veneer (in.)
1/16	3	1/48, 1/48, 1/48
3/32	3	1/40, 1/20, 1/40
1/8	3	1/40, 1/12, 1/40
3/16	3	1/20, 1/12, 1/20
1/4	5	1/20, 1/20, 1/20, 1/20, 1/20

The use of greater thicknesses, which is confined to such things as engine bearers, instrument boards, may be provided for by combining two or more of the above into a single sheet of plywood for glueing. For core material the use of poplar is recommended. For face material three types prove satisfactory. Birch, the first type, is the hardest and also the strongest of the three types. Mahogany, the second type, is a little less hard, and also a little less strong than birch. Spanish cedar is the lightest and also the weakest for a given size.

(To be concluded)

The National Balloon Race

The National Balloon Race which will start at Milwaukee on May 31, next, promises to be a highly successful affair. The Aero Club of Wisconsin, under whose direction the race is organized, will also stage a series of airplane contests, thus making the event a combined lighter-than-air and heavier-than-air demonstration.

The program calls for an inspection and visitors' day, on May 30, when the Milwaukee Ball Park will be thrown open to the thousands of visitors who are in Milwaukee on Memorial Day. In addition, on this same day there will be several airplane races around the city, and starting and landing contests at both the Milwaukee Air Port and the Hamilton Field at Cudahy. On May 31 the inflation of the balloons will be completed and the contestants in the National Balloon Race will be sent on their way.

The Aero Club of Milwaukee has been assured that a number of Army airplanes will participate in these contests. Brig. Gen. William Mitchell, Assistant Chief of Air Service, intends to fly to Milwaukee from Washington, D. C., together with two other ships, while other airplanes are expected from Chicago, Monmouth, Ill., Detroit, Minneapolis, Dayton and New York. Altogether the organizers expect to have some thirty airplanes present.

For the National Balloon Race thirteen entries have been received to date. The entries include three Army and two Navy balloons, and eight civil balloons. The pilots of the government balloons are not known as yet, but the list of the civil entrants are as follows:

Ralph Upson, New York.
J. S. McKibben, St. Louis, Mo.
H. E. Honeywell, Clayton, Mo.
R. F. Donaldson, Springfield, Ill.
Warren Rasor, Brookville, Ohio.
B. Von Hoffman, St. Louis, Mo.
W. T. Van Orman, Akron, Ohio.
John Berry, St. Louis, Mo.

The National Balloon Race also has an international aspect in that the three pilots finishing first, second and third will represent the United States in the international Gordon Bennett Balloon Race which will be held at Geneva, Switzerland, on Aug. 6, 1922.

The international balloon race for the Gordon Bennett Trophy was an annual event until the war in Europe prevented its being held from 1913 to 1920. The 1913 race was won by Ralph H. Upson, the American entrant, which brought the 1920 race to the United States. This contest was held at Birmingham, Ala., Oct. 23, 1920, with seven contestants; one Belgian, one French, two Italian and three American. In this race, the aeronauts descended in the vicinity of the Great Lakes. The winner, Lieut. De Muyter of Belgium, landed at North Hero Island, Vt., 1100 miles from Birmingham. This gave the 1921 international race to Belgium. The international race last year was intensely interesting and was won by the Swiss pilot Armbruster, giving Switzerland the 1922 event. Ralph Upson competed and was among the first trio, while Von Hoffman and McKibben landed in the Irish Sea fourteen miles from Dublin and had a miraculous escape.

The highest art of ballooning finds expression in the national and international races. These commonly run from 400 to 1200 miles distance, and 18 to 60 hr. duration. These necessarily draw on almost every talent that a man has—knowledge of navigation and meteorology, experience in its application, ability to size up the actual conditions, good judgment in their interpretation, practical skill in handling the balloon, firmness in adhering to a good plan of action, but always with eye and mind open for a better one, courage or caution where necessary, and plenty of plain physical endurance, without forgetting good sportsmanship.

The race which starts from Milwaukee on May 31 will be for distance, and the pilots must choose the best wind currents at different altitudes and dispose of ballast and gas to the best advantage, in order to land the greatest possible distance from the starting point. To do this successfully involves some hundreds of different problems.

In free-ballooning, meteorology is everything. To meteorology and its newest branch, aerology, the pilots of free-balloons turn to solve the problems of the location and condition of their courses in the free air; the racing balloonist seeks the factors of greatest speed and longest fetch of the winds at all attainable levels; with due consideration of course for the factors of direction, stability, etc. In the last five years the study of upper-air conditions has taken such strides that today, without the intelligent use of the data thereby acquired, no pilot, however daring, lucky or enduring, can hope to remain in the front rank.

Season Ideal for Race

The time of the year is considered ideal for ballooning, and it has been figured out that the direction of the wind during the past forty years has averaged in a northwestern direction. This will take the pilots and balloons far into Canada, it is believed, and all of them will carry winter equipment.

It is expected that given favorable winds some of the contestants will remain in the air two or three days.

The men who are behind this race are business men who like ballooning and flying as a sport. It is their endeavor to make a financial success of the race, so that the business interests of the city will not be asked to contribute to any deficit. It is expected that the paid admissions at the ball park on May 30 and May 31 will raise a sufficient fund not only to take care of all expenses, but to leave in reserve a sufficient fund to establish an aeronautic treasury in connection with the Association of Commerce in behalf of the Aero Club of Wisconsin.

The National Balloon Race of 1922 will be under the following committees and chairmen:

General chairman, F. A. Vaughn; general secretary, J. S. Smith; committee on finance, Walter Keenan; committee on airdromes and landing places, Gilles Meisenheimer; committee on campaign, Rudolf Hokanson; committee on gas, R. B. Brown; committee on grounds, E. J. Meisenheimer; committee on baseball tickets, H. B. Mortimer; committee on reception, Mayor Daniel W. Hoan; committee on photography, A. H. Toepfer; committee on contest, Thos. F. Hamilton; committee on safety, Chief of Police, Jacob Laubenheimer; committee on transportation, Rudolf Hokanson; committee on meteorology, W. P. Stewart; committee on affiliation, Gilbert V. Martin; committee on pilot assistance, P. F. Lewis; committee on sand, Raymond M. Payne; committee on information, Harry E. Wilson; committee on membership, Charles John; committee on program, Hans Herzfeld; committee on concessions, Walter Keenan; committee on illumination, Otto J. Juttner; committee on badges, Wm. F. Maas; committee on equipment, Max Friedman; committee on radio, L. S. Baird.

Parachutes on Lighter-than-air Craft

Use not Required on Free Balloons of Air Service -- Only Employed on Kite Balloons and Airships

The use of parachutes in free balloon flights is not required by the Army Air Service, for the training of free balloon pilots enables them to operate the balloons with such a degree of safety as to make it unnecessary to rely upon parachutes. This is accomplished by the careful watch of instruments carried on the flight, which register altitude, ascent or descent, and rate of ascent or descent, in feet, per minute. Plenty of sand is carried along as ballast and is used to compensate for the loss of lift in the balloon caused by condensation of the gas, thus enabling the pilot to keep the balloon in the air at a practically uniform altitude.

When the hydrogen gas expands—due to an increase in temperature, increase in altitude, or the effect of the sun—the tendency, of course, is for the balloon to rise. In order to maintain the same elevation, therefore, it becomes necessary to release a small amount of gas over and above that lost through the appendix of the balloon in order to prevent the gas bag from having an increased lifting capacity.

Not Used on Free Balloons

Parachutes in themselves weigh a considerable amount, and are, therefore, of no utility in adjusting the balance of gas and weight necessary to maintain the balloon at an equilibrium in the air or to cause it to operate at the will of the pilot. A mere handful of sand is often sufficient to cause the pilot to rise to another altitude which may be from fifty to several hundred feet above that formerly held by him.

The only probable occasion on which a parachute would be used from a free balloon is that when the balloon is caught in an unfavorable wind at high altitude, and is in danger of being carried out to sea before it can be landed. In that case, it would be necessary for all passengers of the car to leave the basket within a few seconds of each other, in order that they may land within a reasonable distance from the point over which the parachute jump was made. Such an occasion would probably never occur, as it would be a great reflection on the pilot to lose his balloon under such circumstances when a little foresight on his part would have caused the landing to be made within the limits of the shore.

Thunder storms are naturally feared by aeronauts, and rightly so, owing to the static conditions prevailing at the time. In case the balloon was struck by lightning it would, of course, be too late for the occupants to resort to parachutes. To carry them for that purpose would simply be a loss of control of the balloon due to that extra weight of the parachutes which cannot properly be used as ballast.

Occasional failure of parts of free balloons to function, and a very rapid rise to extreme heights, has been known to result in the envelope of the free balloon bursting when in flight. Under such conditions the fabric is blown up against the net to which the basket is attached. In this position the entire balloon acts as a parachute. While not as efficient as a specially designed parachute, aeronauts have been known to descend from great heights with their balloon parachuting, and have landed without any serious results.

Parachutes on Airships

The parachute, however, is used on all airships and for flights in captive balloons. If, for unforseen causes, the power plant of the airship fails to function, or in case the captive balloon is turned loose from its cable, the aircraft must of course be operated as a free balloon. In the case of the airship this could probably be accomplished without resorting to the use of parachutes.

In the case of the captive balloon, however, the immediate result of such an accident is for the balloon to rise rapidly to great height, the gas, in the meantime, expanding to an enormous degree owing to the lesser density of the atmosphere at higher altitudes. In addition, a captive balloon is not equipped with an appendix to allow of a free escape of gas. Under certain circumstances this expansion may be so great as to cause the balloon to burst. In order to meet such a situation, it seems advisable for the pilot immediately to open up his gas valve to enable the release of as much gas as possible, and then for him to descend by parachute in order to avoid the danger of explosion. This may result in the loss of the balloon but is by far the safer method of meeting such an emergency. Pilots have often remained in control of the balloon during such flights and have safely landed.

In this connection it is interesting to note that in any other lighter-than-air craft than the free balloon, it is necessary to keep a continuing record of the purity of the hydrogen gas in the envelope, and to constantly watch the pressure of that gas. A uniform pressure must be obtained in order that the gas bag never collapses, due to lack of hydrogen content, nor bursts due to excessive pressure.

In captive balloons and airships uniform pressure is maintained either by letting out small amounts of gas when necessary or by pumping air into an air chamber inside of the gas envelope, thus increasing the pressure of the gas in the remaining chamber of the envelope. The purity of the gas is tested each day and must be carefully safeguarded in order that there may be no danger of explosion due to explosive mixtures of hydrogen and air.

The hydrogen normally used in lighter-than-air craft is of 99 per cent purity. This percentage of purity gradually falls due to diffusion or leakage of air through the fabric and pressure of air against the envelope while in flight. In order to keep up the purity it becomes necessary to keep the balloon fed with fresh hydrogen each day, to the amount of from 1/20 to 1/12 of its capacity. By continually feeding in hydrogen of high purity there is not alone maintained the necessary percentage of purity for a considerable length of time but there is provided the extra volume of new gas required to take the place of that which has permeated through the balloon envelope.

Dallas Activities

Dallas, Tex. maintains a municipal flying field under the management of the Mc Graw Aviation Co. This is one of the best equipped fields to be found in the south. The Mc Graw Co. have excellent facilities for assembling and repairing ships and supplying gas, water and supplies. They are using Standard JE 1 planes converted into four and five seaters by increasing the longerons about nine inches and installing 180 horse-power Hispano-Suiza engines. The field is located almost in the heart of the city and measures one mile long by one half mile wide. It also supplies three way landing facilities. It is understood that the government is contemplating using the Dallas Municipal Field as a stopover point between San Antonio and Post Feld.

Dallas is another southwestern city which maintains an aerial police force, and this force is understood to be very well equipped. The San Antonio aerial police were recently called upon to assist in locating bandits who robbed the New Braunsfal bank on March 11 of $70,000. The country is rough and practically impassable for cars in many places. The San Antonio Aeronautical School supplied three ships which were in the air twenty-eight minutes after the robbery had been reported. One of the planes located the bandits just before they crossed the border into Mexico, but not being equipped with radio, and the country being too rough to land in, their capture was not effected.

Reports from our Texas correspondent indicate that aviation business is assuming in that region larger proportions this spring.

Water Jacket Temperature and Performance

Investigation Shows how the Variation of Water Jacket Temperature Affects Performance of Aviation Engines

*By Iskander Hourwich**

The variation of water jacket temperature can affect engine performance in two major ways: (a) In its effect on volumetric efficiency, (b) In its effect on the vaporization of the fuel.

Effect on Volumetric Efficiency

As regards the first of these, the charge of combustible mixture during the induction stroke undoubtedly absorbs some heat from the water jackets. The mass of the charge will vary inversely as the absolute temperature, and therefore the greater the quantity of heat absorbed from the jackets, the smaller the mass of the charge, i.e., its volumetric efficiency. Since if all other things were equal, the power output would vary directly with the volumetric efficiency, it can be expected that the power output would be lower the higher the wall temperature (i.e., the higher the wall temperature, the greater is the difference in temperature between the charge and the cylinder walls, and consequently, in accordance with the observed laws of heat transference, the greater the flow of heat from the walls to the charge).

In Table I are summarized the results obtained on two tests of a 12 cylinder Liberty engine and a model H Hispano-Suiza engine made by the Engineering Division of the Air Service.† It will be noted, in the first place, that the power output falls with the increase of the water outlet temperature. This is most marked at the low rotational speeds. The reason, obviously, is because at the lower speeds, the duration of the induction stroke is longer and the charge has more time in which to absorb heat from the walls.

Hispano-Suiza and Liberty

It will also be observed that the change in outlet temperature was most marked in its effect on power output with the Hispano-Suiza engine than with the Liberty engine (in neither engine, however, did the variation in output approach in magnitude the variation of the water jacket temperature). In the case of the Hispano-Suiza engine the maximum variation in power output was over 7 per cent at 1400 r.p.m. and over 4 per cent at 2200 r.p.m., the highest speed. The Liberty on the other hand showed a difference of less than 3 per cent at the lowest speed, 1200 r.p.m., and a difference of about 1 per cent at the highest speed, 1900 r.p.m. The probable explanation of this difference in effect lies in the difference of construction of the two engines. In the Liberty engine, the water comes in direct contact with the metal of the combustion chamber and cylinder barrel. In the Hispano-Suiza engine, the cylinder heat has to be transferred through an intervening wall of metal and film of air (the steel barrels are screwed into an aluminum water jacket, and the water comes only in direct contact with the aluminum). For this reason the temperature difference between the combustion surfaces and the jacket water in the Hispano-Suiza engine must be considerably greater than in the Liberty engine, and the heat absorbed by the induction charge correspondingly greater.

In general, the temperature of the cooling water is only one of several similar factors affecting power output. For instance the heat in the induction passages, valves and valve ports, at the hot spots, etc., all *tend* to affect the volumetric efficiency. The effect of most of these, however, diminishes as the time decreases in which a unit of the induction charge remains in contact with them, and is determined to a large extent by the water temperature. These effects differ widely with the particular engine construction employed and would be isolated with difficulty.

* In charge, compilation of "Air Service Engine Handbook", McCook Field, Dayton, Ohio, W. J. Foster, assistant.

† See Engineering Division Reports, Serial Nos. 863 and 925, McCook Field, Dayton, Ohio, 1919.

Effect on Fuel Consumption

As regards the effect of water jacket temperatures on fuel consumption, the results are not obvious. It might be expected that as the water jacket temperature is increased, the vaporization of the fuel would be increased, and, conversely, as the temperature is lowered, a critical point would soon be reached at which little of the fuel would be vaporized. This condition might be manifested in two ways: (a) the fuel consumption would decrease as the temperature increased; (b) the horsepower would increase as the temperature, and therefore the atomization, increased. It has already been shown that the facts contradict (b). The condition suggested in (a) is likewise not borne out by the facts. Reference to Table II shows that the specific fuel consumption remains practically the same within limits of experimental error, regardless of the water jacket temperature. What changes did occur apparently do not follow any specific law and are almost contradictory between the two engines.

TABLE I. EFFECT OF VARYING WATER JACKET TEMPERATURES ON POWER OUTPUT

	Liberty 12				
R.p.m.	Brake Horsepower at Water Outlet Temperatures °F.				
	110°	130°	150°	†170°	190°
1200	308.0	306.0	303.6	302.8	300.5
1700*	418.0	418.5	418.4	416.0	414.0
1900	443.0	444.0	446.0	447.0	442.0
	Model "H" Hispano-Suiza				
R.p.m.	90°	110°	130°	**150°	170°
1400	246.0	240.0	232.5	235.0	228.5
1800*	322.5	317.5	313.0	313.0	310.5
2200	368.0	367.5	364.0	358.5	353.5

TABLE II. EFFECT OF VARYING WATER JACKET TEMPERATURES ON SPECIFIC FUEL CONSUMPTION AT NORMAL SPEED OF THE TWELVE CYLINDER LIBERTY AND MODEL "H" HISPANO SUIZA ENGINES

Water Outlet Temp. °F.	Fuel consumption, lb. per b.h.p. hr. Liberty (1	Hispano (2
90	.....	0.512
110	0.520	0.512
130	0.518	0.534
150	0.502	0.514 (3
170	0.514 (3	0.512 (4
190	0.513	.....

* Normal Speed.
† Normal operating outlet temperature.
1) Normal speed is 1700 r.p.m.
2) Normal speed is 1800 r.p.m.
3) Normal operating temperature.
4) Engine showed signs of overheating.

Helium in Canada

It is generally believed that the United States has a virtual monopoly of helium gas in that the latter is found in large quantities only in the natural gas pools of the Southwest.

In view of this belief much interest attaches to a communication received by AVIATION from a Canadian correspondent, E. L. Chicanot of Montreal, P. Q., in which the writer calls attention to the existence in Canada of a large natural gas field which, he claims, has the highest helium contents known. This field stretches from Medicine Hat to Calgary and supplies natural gas to these two centers as well as to numerous small towns in Southern Alberta.

During the war, Mr. Chicanot states, a secret plant was maintained at Calgary for the purpose of extracting helium from the natural gas fields of the region, and quantities of this helium were shipped in tanks to France, where the Royal Air Force used the gas for inflating lighter-than-air craft. After the Armistice the Calgary plant was shut down for reasons of economy so that at the present time the helium resources of those fields are going into thin air at the rate of about 1,000,000 cu. ft. per month.

Aviation Weather for Military Operations

Importance of Correct Weather Forecasting for Aircraft Has Caused Wider Investigation of the Upper Atmosphere

By William F. Reed, Jr., Lieut. U.S.N.R.F.

Before aviation became an arm of the fleet the influence of weather conditions was not so keenly felt as it is now, when airplanes and airships are drifted away in the steady streams that are constantly passing through the air overhead.

The true benefits derived from aircraft in warfare lie in the convoy of vessels, the patrolling of seacoasts, search for enemy submarines, aerial bombing, aerial photography and the observation of enemy movements from planes, captive balloons and airships.

Taking Advantage of the Wind

A study of the effect of current weather conditions on airships and airplanes, the collection of aerological data, the prediction of suitable aviation weather for aircraft operations, and the prediction of local and cyclonic storms or the visitation of unfavorable winds for flight operations, has caused the aerologists and meteorologists of recent years to realize the importance of a greater knowledge of the winds of the upper cloud levels than was thought necessary before airplanes or airships were considered for war or commercial use.

During the World War when aircraft approached enemy territory they would more often fly against the wind than with the wind so that the advantage would be in their favor when returning. When attacks by fire or gas were made the side on the offensive would consult the official meteorologist who would determine the strength and direction of the wind at different altitudes and advise as to the probability of the breezes remaining steady, or, at what time the next shift in the wind could be expected along the battle front.

A commander in chief of the fleet when formulating his strategical or tactical plans wants to know the weather probabilities; whether there will be rain, snow, mist, fog, or sunshine, and what the direction and force of the wind will be at the surface and at high altitudes.

Airships and airplanes drift at approximately the speed of the wind, while steamers are drifted comparatively little by the moderate surface winds, but are retarded by head winds and high waves, and sometimes drift ashore. It is therefore important for the fleet to be guided by meteorological advices from reliable sources concerning cyclonic storm movements and take circuitous routes to avoid headwinds when they are ordered to proceed hastily to some objective.

Importance of Reliable Weather Reports

Reliable weather reports gathered by the fleet meteorologist from distant scouting vessels and airships and also from shore stations will serve to great advantage in determining whether or not attacks can be made by aircraft, submarines, destroyers or battleships. Onshore winds with clear air at sea give good visibility for the observance of an approaching enemy fleet, while smoky offshore winds may make fleet maneuvers difficult and screen an approaching enemy fleet; here again the meteorologist should be able to tell the probable duration of poor visibility.

A fleet meteorologist must know the signs of approaching local thunderstorms and cyclonic storms; he must be familiar with the various cloud formations that precede these disturbances, together with the wind shifts and barometric conditions that accompany them.

It is probable that radio communication may be suspended in time of war when a fleet is proceeding in battle formation and other means of communication used; however, the radio operators copy everything and turn their copy over to intelligence officers who translate the weather reports and chart them. During war periods when weather reports and probabilities are meager the meteorologist must depend a great deal upon his local meteorological instruments and the structure and movements of clouds in order to give proper warning to the commander in chief of approaching storms when the planes and airships would be called in and the course of the fleet changed to avoid storm damage and the separation of vessels on account of high winds, rough seas and poor visibility.

When rigid airships are moored to mooring masts they swing freely like a wind vane and can weather severe storms, but where hangars are required to house them, definite and accurate information for even the moderate winds must be given because of the difficulty in handling them on account of the immense surface exposed to wind pressure and the number of men it requires on the lines to keep them guided into hangar entrances without injury, especially when the ship gets broadside to the wind. At training stations the aerologist must keep closely in touch with airship operations and inform the pilots of changes in barometric pressure and temperature, the probability of fogs or squalls and the increasing or decreasing gustiness and direction of winds at the surface and a few hundred feet up so that safe landings can be made.

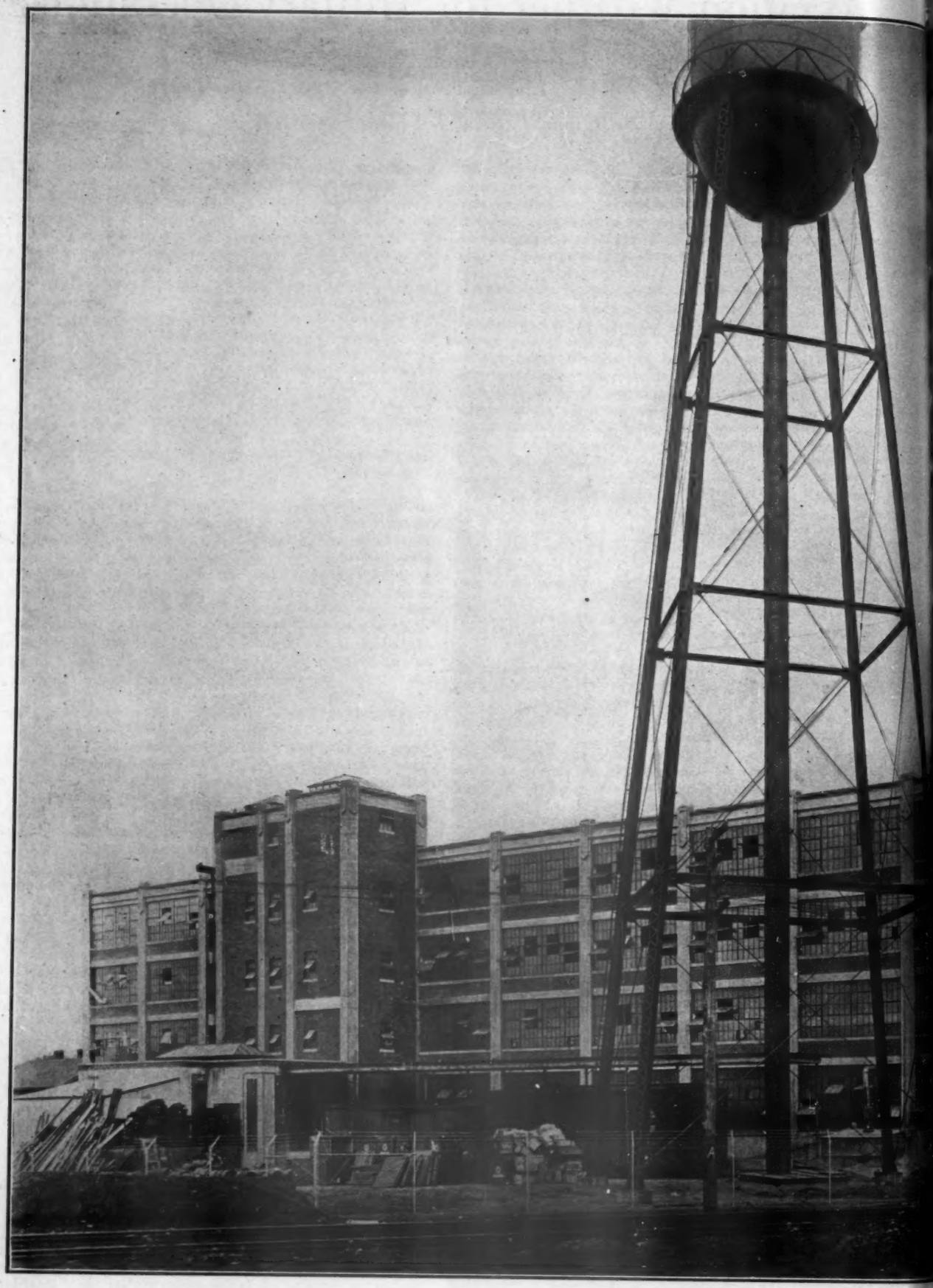
Some War Experience

The bombing operations of the German rigid airships were all well planned as to favorability of weather and, in their naval engagements they waited for favorable conditions and sent their large rigid airships on long scouting expeditions to determine the position and report the movements of enemy vessels. At the outbreak of the war they could bomb successfully at 3000 ft. and know what winds they would be likely to encounter; but, before the close of the war they were chased to higher altitudes by anti-aircraft guns and searchlights, in clear weather to 18,500 ft. At these high altitudes they found the discomforts of airsickness, exhaustion from lack of oxygen, numbness from cold, decreased engine power in the rarefied air, inaccurate and difficult bombing, and higher winds to drift them far away from their objectives and home bases; however, the airships were found to have a number of advantages over the airplanes; they could climb faster and get away from enemy pursuit planes, their cruising radius was greater, they could cruise slowly or idle in convoy work, they could hover over one spot, detect, and bomb submarines; they could fly with greater safety in fog or clouds, and they could hide in clouds and drift silently over enemy territory.

Some have imagined that the planetary wind circulation, of which the "trades" are a part, is a constant and dependable factor for transcontinental or transoceanic flights; but this is only partly true. The trades are broken up by the monsoon wind systems and by cyclonic storms and anticyclonic wind conditions up to great heights in our atmosphere and we must therefore have in hand at the time of contemplated flights definite data concerning climatic conditions and the prevailing winds and weather at the surface and aloft successfully to navigate the air.

There are a number of interferences in radio communication called "static" which are most pronounced during the passage of thunderstorms and squally weather conditions. It is important that all those who travel the air get familiar with these sounds when storms are passing and apply the knowledge of increasing static in their radio set as a warning in the future when storms are getting closer, or when they are flying closer to a storm.

The Office of Naval Communications broadcasts twice daily for the benefit of commercial, marine and aeronautical interests, a bulletin furnished by the Weather Bureau which contains weather conditions prevailing over our continent together with forecasts and storm warnings for different zones; by sending a request to the Chief of the Weather Bureau one can get a circular of explanation, giving the time of broadcast, wavelength, and methods of translating the groups of figures.



WHERE WRIGHT AERONAUTICAL ENGINES ARE MADE

ACREAGE. Approximately 7 acres, located on Main Line of Erie Railroad.

AREA. 90,000 square feet.

DESCRIPTION. Four floors, size 75 ft. by 300 ft. Concrete and steel heavy mill type construction, 250 pounds per square foot loading.

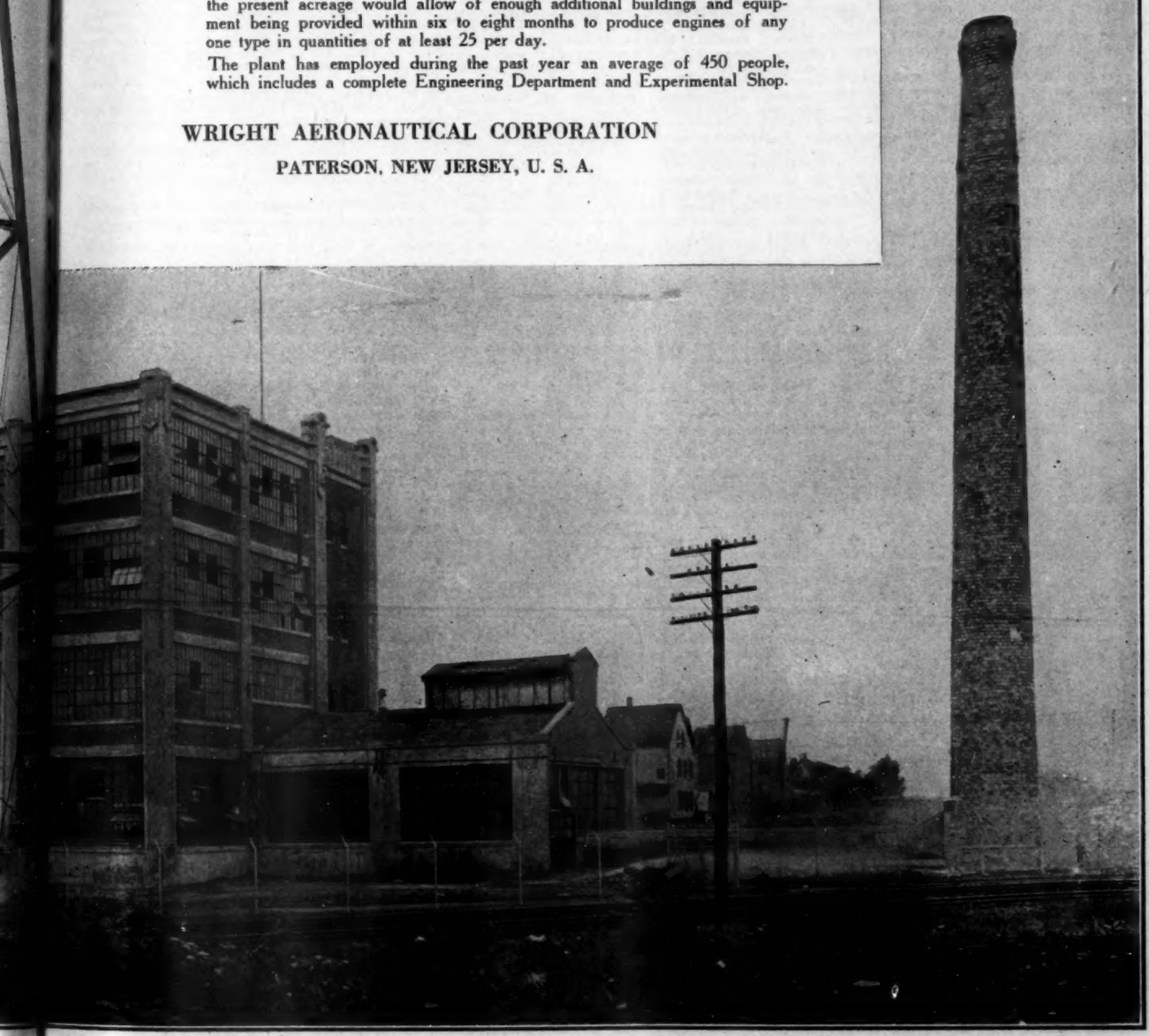
EQUIPMENT. The plant is equipped at present to produce, and is producing, approximately 300 engines per year, with spare parts therefore, and has ample capacity in addition to provide adequately for all spare part requirements for all types of engines previously produced. The equipment of the plant provides for the complete manufacture of various type engines produced, including bronze and aluminum castings, except bar steel and drop forgings.

The capacity of the present plant could be expanded to produce engines at the rate of five per day in the present building. In an emergency the present acreage would allow of enough additional buildings and equipment being provided within six to eight months to produce engines of any one type in quantities of at least 25 per day.

The plant has employed during the past year an average of 450 people, which includes a complete Engineering Department and Experimental Shop.

WRIGHT AERONAUTICAL CORPORATION

PATERSON, NEW JERSEY, U. S. A.



"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

The biographical sketches of men who are prominent in American Aeronautics are printed periodically in AVIATION. The first series will be shortly published in a more durable form, and revised issues will be published semi-annually to take care of the frequent changes in station of Army and Navy officers, and such other changes as may occur. As errors and omissions are liable to occur in a compilation of this character, interested parties are requested to notify "Who's Who" Editor of the necessary corrections so the record may be kept up to date.

Harold Morton Hine

HINE, HAROLD MORTON, Research Engineer; born, New Haven Conn., June 28, 1887; son of Rufus Edwin Hine and Emily Watkins (Hovey) Hine; married, Ruth Eldridge Pember, April 18, 1917.

Educated: Public schools of New Haven, Conn.; B.S., Wesleyan University, 1912; M.S., Trinity College, 1920.

Professional: Science Instructor, Enfield and Hartford, Conn., 1912-1917; research and safety engineering, Travelers Insurance Co., 1919 to date.

Aeronautical Activities: Flying cadet, Collegiate Balloon School, Macon, Ga., Dec. 1917 to March 1918; flying cadet, Instructor and Asst. Post Signal Officer, Army Balloon School, Fort Omaha, March 1918 to Jan. 1919; research and investigation of the subject of aeronautics in connection with aircraft insurance, 1919 to date.

Flying Rating: Free Balloon Pilot, Ae.C.A. License 482; Aerial Observer, July 26, 1918.

War Service: Dec. 1917 to Jan. 1919.

Books: Chief author "Airplanes and Safety", Travelers Insurance Co.

Member: American Society of Safety Engineers; American Society for the Advancement of Science; Army and Navy Air Service Association; Aero Club of Hartford; Sons of the American Revolution; University Club of Hartford.

Present Occupation: Research and Safety Engineer, Travelers Insurance Co.

Address: 700 Main St., Hartford, Conn.; home, 159 North Beacon St., Hartford, Conn.

John A. Carpenter Warner

WARNER, JOHN A. CARPENTER, Engineer; born, Putnam, Conn., July 12, 1893; son of Edgar Morris Warner and Jane E. (Carpenter) Warner; married, Marion W. Andem, March 25, 1920.

Educated: Public Schools, Putnam, Connecticut; Worcester Polytechnic Institute, B.S. in Mechanical Engineering, 1917; Ecole superieure d'Aeronautique et de Construction Mecanique, Paris, France, 1919.

Professional: Materials Testing, Bureau of Standards, 1917, and as noted below.

Aeronautical Activities: Testing of Aircraft Materials, Bureau of Standards, 1917; Member, Technical Section, Aircraft Instrument Division, U. S. Air Service, Paris, France, 1918-1919; Executive Officer, Aeronautic Instruments Section, Bureau of Standards, Washington, D. C., 1920-1922; Aeronautical Representative, Bureau of Standards, in Great Britain and Europe, 1921.

War Service: United States Air Service, October 1917 to July 1919; A.E.F., December 1917 to June 1919; Rank, 2nd. Lieutenant.

Publications: Reports on Aeronautic Instruments, National Advisory Committee for Aeronautics Publications.

Present Occupation: Executive Officer, Aeronautic Instruments Section, Bureau of Standards, Washington, D. C.

Address: 1357 Monroe Street, Washington, D. C.

Francis Thomas Evans

EVANS, FRANCIS THOMAS, Maj., U.S.M.C.; born, Deleware, Ohio, June 3, 1886; son of F. T. Evans and Alice (Brown) Evans; married, Elizabeth Kibbey, June 12, 1917.

Educated: Delaware High School; Ohio Wesleyan, 3 yr.

Professional: 2nd Lieut., Jan. 1909 to Sept. 1913; 1st Lieut., Sept. 1913 to Aug. 1916; Capt., Aug. 1916 to June 1920; Maj. June 1920 to date; temporary Maj., July 1918.

Aeronautical Activities: Began flying, Pensacola, July 2, 1915; C.O., N.A.S., Cape May, Aug.-Dec. 1917; C.O., air detachment, Porta del Gada, Azores, Jan.-July 1918; C.O., Marine Flying Field, Miami, Aug. 1918 to April 1919; C.O., Marine Flying Field, Quantico, July 1919 to March 1921; C.O., 4th Air Squadron, Port au Prince, Haiti, April 1921 to date.

Flying Rating: Naval Aviator, No. 26; Navy Air Pilot, No. 22.

War Service: April 6, 1917 to Nov. 11, 1918.

Present Occupation: C.O., 4th Air Squadron, U.S.M.C.

Address: Port au Prince, Haiti; home, Delaware, Ohio.

William Frederick Durand

DURAND, WILLIAM FREDERICK, Professor; born, Bethany, Conn., March 5, 1859; son of William L. Durand and Ruth (Coe) Durand; married, Charlotte Kneen.

Educated: U. S. Naval Academy, 1880; Ph. D., Lafayette College, 1888.

Professional: Engineer Corps, U. S. Navy, 1880-1887; professor of Mechanical Engineering, Agricultural & Mechanical College, Mich., 1887-1891; Professor of Marine Engineering, Cornell University, 1891-1904; Professor of Mechanical Engineering, Leland Stanford Junior University 1904 to date.

Aeronautical Activities: Appointed by President Wilson in 1915 one of the original twelve members of the National Advisory Committee for Aeronautics; elected chairman of the committee in 1916; re-elected in 1917; Scientific Attache to the American Embassy, Paris, during war.

Books: Fundamental Principles of Mechanics (1889); Resistance and Propulsion of Ships (1898); Practical Marine Engineering (1901); Motor Boats (1907); Experimental Research on Air Propellers I to V inclusive, published as Reports 14, 30, 64, 109, 141 of the N.A.C.A.

Member: National Academy of Sciences; American Philosophical Society of Mechanical Engineers; Society of Naval Architects and Marine Engineers; Societe Technique Maritime; life member and gold medalist, American Society of Naval Engineers; fellow, American Association for the Advancement of Science.

Present Occupation: Professor of Mechanical Engineering, Leland Stanford Junior University; member National Advisory Committee for Aeronautics.

Address: Stanford University, Calif.

John Fillmore Hayford

HAYFORD, JOHN FILLMORE, Professor; born, Rouse's Point, N. Y., May 19, 1868; son of Hiram Hayford and Mildred Alevia (Fillmore) Hayford; married, Lucy Stone, Oct. 11, 1894.

Educated: C.E., Cornell, 1889.

Professional: Appointed Computer, U. S. Coast & Geodetic Survey, June 1889; Asst. Astronomer, International Boundary Commission, 1892-1893; Aid and later Asst., Coast & Geodetic Survey, 1894-1895; Instructor in Civil Engineering, Cornell University, 1895-1898; expert computer and geodesist, Coast & Geodetic Survey, 1898-1899; Inspector of geodetic work and Chief computing div., 1900-1909; Director, College of Engineering, Northwestern University, Sept. 1, 1909 to date.

Aeronautical Activities: Appointed one of original members of National Advisory Committee for Aeronautics, 1915.

Books: Geodetic Astronomy, 1898; also numerous monographs in reports of U. S. Coast & Geodetic Survey.

Member: Fellow, Amer. Assoc. for the Advancement of Science; Nat. Academy of Science; Amer. Philosophical Society; Amer. Astronomical Society; Amer. Soc. of Civil Engineers; Western Soc. of Engineers.

Present Occupation: Director, College of Engineering, Northwestern University; member, National Advisory Committee for Aeronautics.

Address: 574 Ingleside Park, Evanston, Ill.

Clarence Ernest Blodgett

BLODGETT, CLARENCE ERNEST, Student; born, Springfield, Mass., July 28, 1898; son of Elmer Howard Blodgett and Anne Grace (Schermerhorn) Blodgett.

Educated: Preparatory School, Worcester Academy and Clark School, Hanover, N. H.

Aeronautical Activities: Flying training, French army, Camp d'Avord; staff pilot, 2nd A. I.C., Tours, July-Dec. 1918; 258 Aero Squadron, Dec. 1918 to March 15, 1919; commercial flying, 1920, 1922.

Flying Rating: Brevet Militaire, June 29, 1918.

War Service: April 1917 to April 22, 1919.

Honors: American Field Service Medal from French government.

Member: American Field Service Association.

Present Occupation: Student in Dartmouth College.

Address: Phi Gamma Delta House, Hanover, N. H.; home, 110 Keith St., Springfield, Mass.

Richard Raymond Palmer

PALMER, RICHARD RAYMOND, Banking and Foreign Exchange; born, Akron, Ohio, Dec. 8, 1889; son of Frank Leslie Palmer and Clara Etta (Beighlie) Palmer.

Educated: Public schools of Akron, Ohio; Hammel's College; Ohio State University; Mass. Inst. of Tech.

Professional: Assistant Manager, Foreign Department of the Guardian Savings and Trust Co., Cleveland, Ohio.

Aeronautical Activities: Organized Aviation Section in the Ohio Naval Militia at Cleveland, Ohio, 1915-1916; Course in aeronautics at Ohio State University, 1917; Instructor at U. S. Naval Air Station, Pensacola, Fla., 1918.

Flying Rating: Department of the Navy Naval Aviator Certificate No. 1862, Dec. 1918; Aero Club of America Hydraeroplane Pilot's Certificate No. 623, April 1919.

War Service: Landsman Aero Mechanics, Ohio Naval Militia, 1915-1916; Chief Quartermaster, U. S. Naval Reserve Flying Corps May 1918 to Dec. 1918; Flight Instructor, Pensacola, Fla.; Flight Division Commander at U. S. Naval Air Station, Coco Solo, C. Z.; on submarine patrol, convoy, coast patrol and air guard of Panama Canal and fortification on Canal Zone; commissioned Ensign in U.S.N.R. Flying Corps, Oct. 1919.

Member: Marion Club, Indianapolis, Ind.; Aero Club of America.

Present Occupation: Banking and Foreign Exchange.

Address: 623 Euclid Ave., c/o The Guardian Savings and Trust Co., Cleveland, Ohio.

Lawrence Dale Bell

BELL, LAWRENCE DALE, Executive; born, Mentone, Ind., April 5, 1894; son of I. E. Bell and Harriette (Sarber) Bell; married, Lucille M. Mainwarning, July 17, 1915.

Educated: Polytechnic High School, Santa Monica, Calif.

Aeronautical Activities: The Glenn L. Martin Co., Los Angeles, Calif., aircraft construction and airplane and engine maintenance, 1912-1914; Superintendent of Construction, The Glenn L. Martin Co., Los Angeles, Calif., 1914; General Superintendent, The Glenn L. Martin Co., Los Angeles, Calif., 1915; Manager, The Glenn L. Martin Co., Los Angeles, Calif., 1916; Executive, Wright-Martin Aircraft Corp. of New York, and Manager of The Glenn L. Martin Co., Los Angeles, Calif., Jan. to Oct., 1917; Factory Manager, The Glenn L. Martin Co., Cleveland, Ohio, Oct., 1917 to March 1, 1921; March 1, 1921 to date, Vice President & Asst. Genl. Mgr., The Glenn L. Martin Co., Cleveland, Ohio.

Member: Society of Automotive Engineers.

Present Occupation: Vice President and Asst. Genl. Manager, The Glenn L. Martin Co., Cleveland, Ohio.

Address: The Glenn L. Martin Co., 16800 St. Clair Ave., Cleveland, Ohio; home; 2729 Euclid Heights Blvd., Cleveland Heights, Ohio.

Addison Center Burnham

BURNHAM, ADDISON CENTER, Cotton Business; born, Cambridge, Mass., Oct. 27, 1896; son of Addison C. Burnham and Emily H. (Bright) Burnham.

Educated: Andover; Newton Public Schools; A.B., Harvard, 1919.

Professional: Lockwood-Green, Ang. 1919 to date.

Aeronautical Activities: Ground School, M.I.T., 1917; to England, Oct. 1917; on patrol duty, English Channel, 1918; to France, May 1918; Paimboeuf until after armistice.

Flying Rating: Lieut. (j.g.), U.S.N.R.F.

Honors: Navy Cross; "For distinguished service in the line of his profession as commanding officer of a dirigible engaged in patrol and convoy flights in the war zone, in which operations he did exceptional work, pushing his flights to the limit of physical and material endurance."

War Service: 1917 to 1919.

Present Occupation: Cotton Business.

Address: c/o Lawton Mills Co., 56 Worth St., New York City; home, 15 Bracebridge Rd., Newton Centre, Mass.

The Lincoln-Standard Air Coach—a four-seater commercial airplane fitted with a 180 hp. Hispano-Suiza engine

Lincoln-Standard Aircraft Corp.

With the recent reincorporation of the Nebraska Aircraft Corp. of Lincoln, Neb., under the name of Lincoln-Standard Aircraft Corp., a considerable reduction in prices went into effect May 1 on the various models of Lincoln-Standard planes which include the Tourabout, Speedster, Raceabout and Air Coach.

Roy Page, newly elected president of Lincoln-Standard Aircraft Corp., has completed a reorganization of its affairs. The corporation will continue operations on an increased scale with a large number of its latest models completed ready for immediate shipment at all times.

The 1922 model Air Coach, as will be seen from the illustration, is an especially interesting enclosed cabin plane, accommodating four passengers. It is fitted with 180 hp. Hispano-Suiza engine, and has a cruising speed of 80 m.p.h. with a gas capacity of 55 gal. with gravity feed.

The cabin is constructed of plywood, while the interior finish is of mahogany with elaborate upholstery. Ordinary conversation may be held in the cabin which is practically sound proof. Resistal glass in the four windows permits excellent vision.

The Dayton-Wright Flying School

The Dayton-Wright Co. has just issued under the title "Learn to Fly!" an attractively illustrated booklet, which gives interesting information about the flying school of the firm. The Dayton-Wright plant, having 75,000 sq. ft. of floor space and comprising an adjoining field of 200 acres, is located on the Dixie Highway, five miles south of Dayton. Flying students undergoing tuition at the Dayton-Wright school have thus the benefit of being able to observe airplanes under actual construction, which naturally gives them a great advantage over pilots whose knowledge of airplane construction is acquired from mere assembly and dissembly of ships.

For the use of its School, the Dayton Wright Co. has developed a very interesting little side-by-side tractor biplane, called the "Chummy." Perhaps the most remarkable features of this machine are its simplicity and low maintenance cost, as one man can perform all the operations incident to assembly, overhauling and operation. The wing panels are single bay, and with only three wires and two outboard N struts make alignment a comparatively easy operation. On the other hand the cost of spare or repair parts is greatly reduced by making parts interchangeable. For instance, identical tail surface may be used as right hand elevator, left elevator or rudder. Likewise, upper and lower wing panels are interchangeable.

A novel landing gear permits taking off in high grass or brush with a very short run. The location of the gasoline tanks is such that fire at any time is precluded.

The entire structure except wing panels is of seamless steel tubing of low carbon steel with high elongation, which greatly increases the rigidity and durability in changeable climates.

Normally the "Chummy" is fitted with an 80 hp. Le Rhone engine, in which case the maximum speed is 90 m.p.h. The ship can however also be fitted with a 110 hp. Le Rhone, 130 hp. Clerget, or 150 hp. Wright engine, with a corresponding increase in performance. Provision is also made in the design of the machine for fitting it with a 90 hp. Curtiss OX5.

The "Chummy" has been completely flight and sand tested by the Air Service, the tests having been very satisfactory.

Students are trained by what has been called the Improved Gosport System, developed by the Dayton-Wright Co. The seating arrangement of the "Chummy," side-by-side with dual control, permits of constant communication and mutual observation between student and instructor, and renders tuition much easier for both. It is an interesting indication of the confidence of the Dayton-Wright Co. in the safety of proper flying tuition that they no longer require a bond from students using their planes in solo flights.

Sale of Air Mail Equipment

The Division of Air Mail, Post Office Department, Washington, D. C., advises that it will receive sealed proposals, subject to the usual conditions, until 2 p.m., May 20, 1922, at which time they will be publicly opened, for the sale of the equipment summarized below. (A detailed list of the equipment may be obtained on application from the Division of Air Mail.)

The equipment includes the following:

Airplanes, minus Engine—LWF (remodelled for 250 hp. Isotta-Fraschini engine); Curtiss HA.

Seaplanes, minus Engine—Aeromarine 39B.

Airplane Parts—For Curtiss JN4, JN4D, JN4H, JN4HG, R4 and Standard types.

Engines—Curtiss OX5, Hall-Scott, Hall-Scott-Liberty 6, Hispano-Suiza, Isotta-Fraschini.

Propellers—For Hall-Scott (Paragon), Fiat, Hall-Scott-Liberty 6 (LWF, Hamilton, Paragon), Hispano-Suiza (Flottorp, Hamilton, Hartzell, Paragon, Westmore), Isotta-Fraschini (Hamilton, Hartzell) engines. Lang H16 propellers.

Miscellaneous Equipment—Tires, wheels, radiators, instruments, motorcycles, etc.

Bidders have the right to be present either in person or by attorney and to examine and inspect all bids. The Department reserves the right to reject any or all bids. Proposals must be signed by the bidder. The equipment advertised for sale is to be sold "where is, as is."

At least 20 per cent of the entire amount of the bid in the form of a certified check, bond or legal tender, shall accompany bid as a guarantee to fulfillment. Purchaser must make payment in full before equipment is delivered. Refunds will be made to unsuccessful bidders of the entire amount of deposit made. No alterations or modifications of the terms of purchase will be permitted.

New Members, Ae. Ch. of C.

The Aeronautical Chamber of Commerce advises that since the last meeting the following applications for membership have been received.

CLASS B.

Standard Oil Company (Indiana), 910 So. Michigan Blvd., Chicago, Ill. Membership solicited direct by Aeronautical Chamber of Commerce, and application received for membership in Class B. Recommended by the Chamber of Commerce.

Endicott Forging and Mfg. Company, Endicott, N. Y. App'ication solicited and transmitted by Wright Aeronautical Corporation and recommended by same. Application for

CLASS B.

The Electric Storage Battery Co., Philadelphia, Pa.—Manufacturers storage batteries and other electrical equipment. Application transmitted and recommended by Dayton Wright Company.

Hamilton Aero Mfg. Co., Milwaukee, Wis.—Application submitted direct to Aeronautical Chamber of Commerce. Recommended by Johnson Airplane & Supply Company, Dayton, Ohio and others. This company explains that its application was to have been submitted in January, but through error, was held up. It earnestly requests that the date of submittal be recognized and that it be regarded as a charter or founder member.

Macwhyte Co., Kenosha, Wis.—Manufacturers wire and cable. Application transmitted and recommended by Dayton Wright Co.

CLASS C.

S. C. Coon, Dallas, Texas.—Representative in Dallas of Curtiss Aeroplane & Motor Corp. Recommended by the Curtiss Co.

Leon T. Eliel, The Photomap Co., 43 E. Green Street, Pasadena, Calif. Operating and aerial photography. Application transmitted direct to Chamber of Commerce. Recommended by same.

F. W. Farris, 2049 So. California Street, Stockton, Calif.—Operating. Application submitted to Chamber of Commerce. Recommended by same.

R. S. Fogg, Concord Aircraft Co., 65 No. Main St., Concord, N. H.—Operating. Application presented to Chamber of Commerce and recommended by same.

T. Furusawa, 68 Caledonia Avenue, Rochester, N. Y.—Aeronautical Engineering. Application transmitted by Pioneer Instrument Co.

Floyd L. Kelso, Kelso Aviation Co., Lewiston, Idaho.—Operating. Application transmitted and recommended by Foster Russell Aviation Co., Spokane, Washington.

Hugh D. Mc Kay, American Airways, College Point, L. I., N. Y.—Application presented to Chamber of Commerce.

Miss Daisy Smith, Daisy Smith Aviation Co., Spokane, Washington.—Application transmitted and recommended by Foster Russell Aviation Co., Spokane, Washington.

Jack Towberman, Eveleth, Minn.—Operating. Application presented to Chamber of Commerce and recommended by same.

Professor Edward T. Warner, Massachusetts Institute of Technology, Cambridge, Mass.—Application presented to Chamber of Commerce and recommended by same.

Walter T. Varney, 839 Post Street, San Francisco, Calif.—Mr. Varney is the largest operator in Central and Northern California, and it is believed one of the most substantial in the western part of the United States. He has extensive facilities for overhauling and has flown for a number of years, with quite a number of ships, between San Francisco, Los Angeles, Portland and over the mountains. He is recommended by the Pioneer Instrument Co.'s western representative, and by the Chamber of Commerce. His application is transmitted direct.

American Aircraft, Inc., Station F., Box 104, Baltimore, Md.—Distributors and jobbers. Application presented to Chamber of Commerce.

The Aeronautical Chamber of Commerce of America also announces that it has been admitted as a member of the Chamber of Commerce of the United States, the national organization which includes some 1200 or 1500 commercial and civic organizations throughout the United States.

New Andries Air Sled

In the March 28, 1921, issue of AVIATION there appeared an illustration of an air sled built and experimented with successfully by E. J. Andries on Lake St. Clair. This was a two-seater airplane fuselage mounted on runners and was driven at a speed of about 80 m.p.h. by an airplane propeller.

The accompanying illustration shows an improved type of air sled with which Mr. Andries has been experimenting last

The new Andries air sled about to start on frozen Lake St. Clair

March on Lake St. Clair. This "ship" is considerably faster and more responsive to control than the first model. The latter was steered with a foot-bar operating a combination rear skate and air rudder while on the new model the steering control consists of an air rudder only, while the sled is balanced on two runners equipped with rubber bumpers. A tail skid is also provided to take care of excessive jolts. Another innovation is the use of a clutch with the 12 to 15 hp. engine. The overall length of the sled is 14 ft.

General Theory of Thin Wing Sections

N.A.C.A. Report No. 142

This report, by Max M. Munk, of the National Advisory Committee for Aeronautics deals with a new, simple method of calculating the air forces to which thin wings are subjected at small angles of attack, if their curvature is not too great. Two simple integrals are the result. They contain only the coordinates of the wing section. The first integral gives the angle of attack at which the lift of the wing is zero, the second integral gives the moment experienced by the wing when its angle is zero. The two constants thus obtained are sufficient to determine the lift and moment for any other angle of attack. This refers primarily to a two-dimensional flow in a non-viscous fluid. However, in combination with the theory of the aerodynamical induction, and with our empirical knowledge of the drag due to friction, the results are valuable for actual wings also. A particular result obtained is the calculation of the elevator effect.

The following is an outline of the subject as treated in this report: I. Introduction. II. Calculation of the elevator effect. III. General formula for any section. IV. Examples of the zero angle. V. Thin sections with upper and lower boundaries. VI. The moment coefficient. VII. Examples of the moment coefficient. VIII. Table of the sections investigated.

ARMY AND NAVY AIR NEWS

Air Service

Economy Measures in the Air Service—The Secretary of War has, in conformity with the request of the Senate Committee on War Department Appropriations, introduced certain economies in the administration of the Army and the operation of the War Department. In a statement to this effect, submitted in connection with the War Secretary's hearing before that committee, the total amount saved by these measures is given as $40,023,339.96, in which the Air Service figures for $3,400,000. The economies in the case of the latter were "effected by introduction of new methods governing the apportionment of funds and purchase of supplies, gasoline and oil, reduction in amount of work upon various projects, a more economical policy of purchase in connection with the procurement of types of aircraft, reduction in civilian personnel in the Office of the Chief of Air Service, remodeling of airplanes which otherwise would be obsolete, the restriction and closing of certain activities, decrease in civilian personnel in the field and by the concentration of equipment and supplies."

* * *

Aberdeen Proving Grounds—The best bombing record for the Aberdeen Proving Grounds, Md., was made on April 6, when, with 1st Lieut. Max F. Moyer, A.S., and Master Sergeant William F. Fitch, Air Service, as pilots, and Capt. S. R. Stribbling, Ordnance Department, as bomber, a total of seven hits out of eight bombs dropped was recorded. The bombs were dropped from an altitude of 2,000 ft. on the "Hard Surface", a concrete block, 200 ft. by 200 ft. The eighth bomb missed the target by approximately 2 ft. During the week ending April 8, a total of 2600 lb. of bombs were dropped from the Airship C2 on the "Hard Surface".

A special flight was made at the Aberdeen Proving Grounds on April 3 with a Sperry Gyro compass. With J. A. Fitz, of the Sperry company, conducting the test on the compass, a triangular course was flown from Aberdeen to Belair, to Havre de Grace and return to Aberdeen. The performance of the compass on this short run was very satisfactory.

A new radio station has been opened at the Airship Field, Aberdeen Proving Grounds, with an S.C.R. 109 set as the main operating equipment. A wave length of 850 meters has been assigned this set by the Signal Officer of the 3rd Corps Area.

Mitchel Field—Pilots at Mitchel Field had the pleasure, during the week ending April 15, of watching the little Thomas-Morse Monoplane MB7 make test flights. Lieutenant Flier, U. S. Marine Corps, the pilot, put the little ship over a measured course. The time for the flight has not been officially given out and the speed is not known. The pilot estimated, however, that the little plane made well over 180 m.p.h. This ship is a monoplane with a wing spread of only 15 ft. and is powered with a 300 hp. Wright motor. Thus far the pilot has successfully flown the monoplane on numerous occasions without the slightest mishap.

Capt. Clyde V. Finter, A. S., left for Camp Vail, under orders from the Chief of Air Service, for the purpose of cooperating with that station in the development and testing of radio apparatus. This work will occupy about ten days. The plane which Captain Finter flew from Mitchel Field was equipped with the most modern type of radio sending apparatus. Mitchel Field was continuously in touch with Camp Vail by radio telephone during the period of these tests.

As further evidence of the fact that the "Messenger" plane can be readily landed in extremely restricted areas, 1st Lieut. Newton Longfellow, A. S., while flying a Messenger at Mitchel Field, L. I., New York, on April 11, 1922, experienced motor trouble and was unable to reach the main field. He landed in the hospital grounds, however, without difficulty. There are now three of these Messenger planes at Mitchel Field doing development work, and all are making daily flights. Pilots at this station praise very highly the performance of this little ship which is fitted with a 60 hp. three cylinder Lawrance radial engine.

* * *

Mather Field—Out of respect to the memory of the late Second Lieut. Harry Johnson, A. S. R., a three-ship formation flew over Newman, Calif., during his funeral services. The death of this young man saddened many friends he had made while stationed here. He enlisted at Mather in 1919, later qualifying for the grade of flying cadet; got his ground school work at March Field, advanced training here, and was commissioned in the reserve in January 1922. Mr. Johnson was killed when he lost his grip, falling 150 ft. while doing acrobatic stunts from a plane piloted by M. Kelly, who, also used to be a cadet at this field. Pilots of the formation were enlisted fliers—three friends who had been at March during 1921.

The aviation division of Gen. Wu Pei Fu, which effected the capture of the Chinese fleet. The variety of types is remarkable

101st Aero Squadron—The 101st Aero Squadron, Massachusetts National Guard, which is stationed at Boston, was federally recognized Nov. 18, 1921, and was inspected for permanent federal recognition March 3, 1922. Rooms have been assigned to house the squadron at the South Armory, Boston, and a drill period is held there every Friday night from 7:30 to 9:30 p. m.

Of the commissioned personnel of the squadron, the following have been assigned to regular duties: Maj. Charles H. Woolley, Commanding Officer; 2d Lieut. L. E. Boutwell, Adjutant and Supply Officer; 2d Lt. H. N. Carlson, Engineer Officer and Officer in Charge of Instruction.

The strength of the squadron on April 8 was 12 officers and 67 enlisted men. The officers enumerated above are the only ones so far assigned to special duties. Noncommissioned officers have been appointed to act as such until June 1, when examinations will be held for permanent appointments.

Under the direction of Lieut. Carlson, a schedule of instruction has been prepared and closely followed. Assembly is at 8 p. m. About half of each period is given over to basic training, such as infantry drill on the armory floor. The remainder is devoted to technical training. The enlisted men have been divided into sections for technical training, each section pursuing its assigned specialty of rigging, engines, ordnance, etc. Usually, on alternate Fridays the sections meet as a whole for a group lecture, the squadron being especially fortunate in having secured the voluntary services of Prof. E. P. Warner, of the Department of Aeronautical Engineering, Massachusetts Institute of Technology, who is delivering regularly a series of lectures to them.

The problem of securing a landing field and suitable housing facilties for its equipment is the chief concern of the squadron today. It has combined efforts with the Corps Area Headquarters, the Chamber of Commerce of Boston, and the various aero clubs and interested individuals who are behind a bill now before the State Legislature which provides for the construction of a municipal landing field in East Boston which is to be leased for a ten year period to the Federal government for a nominal rental, the field to be used jointly by military and civilian planes, though under Federal supervision. The bill specifies an expenditure by the State of $35,000.00 to level and prepare the runways. Ground adjacent to that leased to the Army is to be leased to civilian and commercial fliers for hangars and shops, and it is hoped that the establishment of this field will lead to the extension of the transcontinental Air Mail service from New York to Boston. The proposed field is within two miles of the Boston Post Office. This East Boston site has exceptionally favorable characteristics for a municipal airdrome from the standpoint of convenience of location, freedom on all sides from obstructions, availability (the whole property is state-owned and at present is lying idle), and its conspicuous position in the harbor making it easy to locate from the air. In addition, being surrounded on three sides by water, it will be available for seaplanes.

The landing field bill has been favorably reported by the Committee on Public Lands. It is now before the Joint Committee of Ways and Means. One hearing has been held. The latest advice concerning its progress in this Committee is to the effect that they are waiting for a definite proposal from the War Department stating exactly what the Army will furnish this airdrome in the event that the bill is passed, and exactly what the cost will be to install and maintain hangars and shops, etc., for the National Guard.

* * *

Chanute Field—The Air Service Mechanics School at Chanute Field, Rantoul, Ill., is functioning in every department. There are now 496 students actually undergoing instruction, and 225 awaiting instruction. The first class of men who were enlisted in the recent recruiting campaign will be graduated on May, 12, 1922. It will consist of twelve armorers.

Following this comes a class of five blacksmiths, who will complete the course on May 26, and the following classes on June, 9, 1922: Armorers—12, Fabric workers—4, Mechanics, airplane—13, Mechanics, airplane engine—14, Mechanics, auto—14, Machinists—5.

The next class will graduate in June 26, 1922, and classes will follow throughout the year at periods of two weeks.

Army Orders—Capt. John M. Holmberg, A. S., has been directed to proceed from Fort Sam Houston, Tex., to Army and Navy General Hospital, Hot Springs, Ark., for observation and treatment.

First. Lieut. John C. Kennedy, A. S., has been relieved from further duty as instructor, Air Service, Maryland National Guard, Logan Field, Dundalk, Md., and will proceed to Mitchel Field, L. I.,, N. Y., and report in person to the commanding officer for duty.

Each of the following-named officers is relieved from his present duties at the station indicated after his name and will proceed to Washington, D. C., and report in person to the chief of branch specified for duty in his office in connection with the procurement plans in preparation by the Assistant Secretary of War: Capt. Shiras A. Blair, A. S., Fairfield Air Intermediate Depot, Fairfield, Ohio; Capt. Dudley B. Howard, A. S., Ross Field, Calif.; First Lieut. Caleb V. Haynes, A. S., Fairfield Air Intermediate Depot, Fairfield, Ohio.

Lieut. Col. Arthur L. Fuller, C. A. C., is relieved from further duty as a member of the Aeronautical Board, Washington, D. C., and will proceed to Portland, Ore., and report in person on or before June 1, 1922, to the president, Spruce Production Corp., for duty with that corporation, relieving Maj. Jacob E. Fickel, A. S., who upon being thus relieved will proceed to Washington, D. C., and report in person to the Chief of Air Service on or before July 1, 1922, for duty in his office.

Capt. David A. Myers, M. C., is relieved from duty at Kelly Field, Tex., and will proceed to Fort Bliss, Tex., for duty as flight surgeon with the 12th Squadron (Observation).

First Lieut. Edwin R. Page is relieved from duty in the office of the Chief of Air Service, to take effect June 30, 1922, and will then proceed to Fairfield, Ohio, and report in person to the commanding officer air intermediate depot for duty.

First Lieut. William E. Connolly is relieved from duty in the office of the Chief of Air Service, to take effect June 30, 1922, and will then proceed to Belleville, Ill., and report to the C. O. Scott Field for duty.

Capt. Asa North Duncan, A. S., is relieved from his present duties at Kelly Field, Tex., and is detailed as an instructor of Air Service, Alabama National Guard. He will proceed to Birmingham, Ala., to take station.

Naval Aviation

Orders to Officers, B. of N.—Lieut. Hutchins C. Bishop (Medical Corps), det. Naval Air Station San Diego, Calif.; to USS Pennsylvania.

Lieut. Arthur S. Judy (Medical Corps), det. R/S San Francisco, Calif.; to duty Naval Air Station San Diego, Calif.

Lieut. Henry R. Oster (Construction Corps), det. Navy Yard New York, N. Y.; to duty Naval Aircraft Factory, Philadelphia, Pa.

Lieut. Richard L. Conolly, det. Columbia University New York, N. Y.; to duty Sperry Gyroscope Co., Manhattan Square, Brooklyn, N. Y.

Lieut. James R. Kyle, det. Massachusetts Institute of Technology, Cambridge, Mass.; to Naval Aircraft Factory, Phila., Pa.

Lieut. Frances M. Mail, det. Massachusetts Institute of Technology, Cambridge, Mass.; to duty under instruction in Engineering Laboratory and Wind Tunnel Laboratory, Navy Yard, Washington, D. C.

Lieut. Warner P. Portz, det. Columbia University New York, N. Y.; to duty Sperry Gyroscope Co., Manhattan Square, Brooklyn, N. Y.

Lieut. Adolph P. Schneider, det. Air Squadrons Atlantic Fleet; to duty Naval Air Station San Diego, Calif.

Lieut. James M. Shoemaker, det. Massachusetts Institute of Technology, Cambridge, Mass.; to duty under instruction in Engineering Laboratory and Wind Tunnel Laboratory, Navy Yard, Washington, D. C.

Lieut. Frederick W. Pennoyer (Construction Corps), det. Naval Aircraft Factory, Phila., Pa.; to duty USS Langley.

Fate of Naval Reserve Officers—Naval Aviation will lose about seventy of its commissioned reserve officers on June 30, if the House Bill passes as it stands today, but it looks as if the Bureau of Navigation was letting these men out now with thirty days leave, so that their services will be terminated on June 1, one month before they would go out under the bill.

All told, about 340 officers of the reserve corps now on active duty will be discharged on June 1, if the present plans are carried out. Of the reserve officers assigned to the Bureau of Aeronautics, the following thirty-four received orders on April 28 to proceed to their homes and to await further orders:

Lt. Comdr. James H. Hawkins, det. Air Squadrons U. S. Atl. Flt.

Lieut. Howard A. Beswick, det. Naval Air Station Hampton Roads, Va.

Lieut. Robert R. Bottoma, det. Naval Air Station Lakehurst, N. J.

Lieut. Smith N. Bradford, det. Naval Air Station Hampton Roads, Va.

Lieut. Thomas H. Chapman, det. Naval Air Station Lakehurst, N. J.

Lieut. Bert H. Creighton, det. Naval Air Station Hampton Roads, Va.

Lieut. Joseph A. Eaton, det. Naval Air Station Hampton Roads, Va.

Lieut. Allen H. Elward, det. Naval Air Station Hampton Roads, Va.

Lieut. James P. Farnham, det. Air Squadrons Atlantic Fleet.

Lieut. Ernest J. Fuller, det. USS Langley.

Lieut. Joseph H. Gest, det. Air Squadrons Atl. Flt.

Lieut. Joseph H. Green, det. Naval Aircraft Factory, Phila., Pa.

Lieut. Robert S. Hedler, det. Naval Air Station Hampton Roads, Va.

Lieut. Robert D. Hively, det. Torpedo Plane Squadron One, Atlantic Fleet.

Lieut. John W. Iseman, det. Naval Air Station Pensacola, Fla.

Lieut. Lauron H. Lovelace, det. Air Squadrons Pacific Fleet.

Lieut. Gordon G. MacDonald, det. Naval Air Station San Diego, Calif.

Lieut. Michael J. McDermott, det Naval Air Station San Diego, Calif.

Lieut. William T. Miller, det. Torpedo Plane Squadron One Atlantic Fleet.

Lieut. Philip D. Naugle, det. Naval Air Station Pensacola, Fla.

Lieut. Leland F. Noble, det. Naval Air Station Pensacola, Fla.

Lieut. Oscar L. Ostin, det. Air Squadrons Pacific Fleet.

Lieut. Erlon H. Parker, det. Naval Proving Ground, Dahlgren, Va.

Lieut. Warren L. Porter, det. Air Squadrons Pacific Fleet.

Lieut. Alvin O. Preil, det. Naval Air Station Hampton Roads, Va.

Lieut. Harry A. Reed, det. Naval Air Station San Diego, Calif.

Lieut. George E. Rumill, det. Air Squadrons Atlantic Fleet.

Lieut. Arthur T. Sewell, det. Naval Air Station Hampton Roads, Va.

Lieut. Ira D. Spaulding, det. Naval Air Station Pensacola, Fla.

Lieut. Wellington E. Stickley, det. Naval Air Station Hampton Roads, Va.

Lieut. Harry H. Thorburn, det. Air Squadrons Atlantic Fleet.

Lieut. Kenneth L. Young, det. Naval Air Station Hampton Roads, Va.

Lt. (jg) Reginald W. Arthur, det. Naval Air Station Pensacola, Fla.

Lt. (jg) Edward T. Garvey, det. Air Squadrons Atlantic Fleet.

Lt. (jg) Robert C. Stephens, det. Air Squadrons Pacific Fleet.

Ens. William P. Cassidy, det. Naval Air Station Hampton Roads, Va.

Ens. Joseph C. Cline, det. Air Squadrons Pacific Fleet.

Ens. Sanders W. Davis, det. Naval Air Station Pensacola, Fla.

Ens. Richard A. Livingston, det. USS Prometheus.

Ens. Alton N. Parker, det. Naval Air Station Pensacola, Fla.

Ens. Frederick O. Schultheis, det. Naval Aircraft Factory, Philadelphia, Pa.

Lt. (jg) Edmond A. Whiting (Construction Corps), det. Naval Inspector of Aircraft G. Elias & Brother, Buffalo, N. Y.

Lieut. George R. Pond, det. Naval Air Station, San Diego, Calif.

Along with the reserve fliers and aviation experts of the Bureau of Navigation who will be dropped by the Navy on or before June 30, four special experts in charge of the Photographic Section, the Aerological Section, the Radio research section of aviation and the pigeon expert of the Navy will be released, it was learned at the Department.

These reserve officers include Lieut. W. L. Richardson, in charge of aerial photography, handling both still and moving pictures not only for aviation but for other naval activities as well.

Lieut. W. F. Reed, who has developed and perfected the Aeronautical weather bureau for the Navy is an expert of several years experience in aerology, believed to be the only officer qualified for this work in the Navy, has been released or will be shortly.

Comdr. A. H. Taylor who is in charge of the radio research in perfecting aircraft radio sets and their operation, is another Reserve officer to be dropped.

The fourth is Lieut. Jas. J. McAtee, in charge of the Pigeon Service of the Bureau of Aeronautics, a function which is of utmost importance as all Naval planes and aircraft carry at least four pigeons on every flight. The training and breeding of these messengers is said to be one of the Navy's most important lines of endeavor toward safety in flight.

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Hampton Roads Naval Air Station—An F5L of this station had a forced landing while making a four-hour fuel consumption test with a twin machine, due to the breaking of one of its generator-drive gears. When the first machine landed in Pocomoke Sound, the other returned to the air station for replacements, the receipt of which enabled the machine forced down to return to its port.

The Navy Airship C7, now filled with hydrogen, made its first cruise last week, being in the air 1½ hr. The flight was for test purposes.

Coming Aeronautical Events

AMERICAN

May 30 — Fourth Annual Aircraft Exhibition, Logan Field, Baltimore, Md.

May 31 — National Balloon Race, Milwaukee.

June 15-17 — Flying Meet, Monmouth, Ill.

Sept. 4 (about) — Detroit Aerial Water Derby, Detroit. (Curtiss Marine Flying Trophy Competition.)

Sept. 15 (about) — Detroit Aerial Derby, Detroit. (Pulitzer Trophy Race.)

Sept. 30 — First Annual Interservice Championship Meet. (In preparation.)

FOREIGN

August — Coupe Jacques Schneider. (Seaplane speed race.) Naples, Italy.

Aug. 6 — Gordon Bennett Balloon Race, Geneva, Switzerland.

Aug. 6-20 — Soaring and Gliding Competition, Clermont-Ferrand, France.

Aug. 9-24 — Soaring and Gliding Competition, Gersfeld, Germany.

Sept. 22 — Coupe Henri Deutsch de la Meurthe. (Airplane speed race.) France.

American elimination trials, if required, to be held about Aug. 15, at Mitchel Field, L. I.

Foreign News

Great Britain—According to London newspapers, thirty new air expresses are to be "put on" the London Continental air service this year to cope with the great increase of traffic. The British contribution includes a number of an improved type of twin-engined Handley Page machines, each for twelve passengers. In addition, there will be a fleet of machines built by the DeHaviland Aircraft Co.

A new fleet of 14- seater Goliath airplanes will be operated by a Belgian company between London and Brussels, while the trials of the first of a fleet of four-engined, 25-seater air expresses that one of the French companies is building, are shortly to take place.

The new Handley Page torpedo-carrying airplane, the first machine fully equipped with the variable slot type of wing, recently underwent further test flights at Cricklewood. As soon as the engine was opened up the biplane jumped straight into the air with practically no preliminary run. When the slots were closed it showed a very high speed; when they were opened again the machine slowed down to practically nil and descended vertically on even keel for more than a thousand feet in a space about as big as a tennis court.

What is more important still, it could have flown away again from the same restricted space. The action of this opening and closing wing is similar to the action of a bird's wing when it opens and closes the main feathers for slow landing on a telegraph wire, and when flying from a confined space.

* * *

Spain—A daily air mail service was inaugurated between Barcelona, Spain and Palma de Malloroa, Balearic Islands on March 20, according to a dispatch from Vice Consul O'Hara to the Department of Commerce. The Compania Aero-Maritima Mallorquina, which is exploiting the aerial line has three Machi and two Savoia flying boats ready for service and another in course of construction in Palma, it is reported. These machines carry mail only, but besides them the company has ordered in Italy two twin-engined flying boats with cabin space for six passengers. All the planes will be equipped with radio. Two hangars and a repair shop have been erected at Palma and plans for the construction of a large and modern factory have been made.

Only a mail service is operated so far, with a plane leaving Palma between 9 and 10 in the morning and leaving Barcelona at three in the afternoon. It is expected that the trip will be made in 1 hr. 15 min. each way, which will be a decided improvement in inter-insular communication facilities and should be a great benefit to commercial interests. After the arrival of the first plane from Palma in Barcelona on March 21, however, the Spanish government directed that no more flights be made until arrangements for inspection by governmental officials could be made. This will soon be effected it is said.

* * *

Mexico—Trade Commissioner P. L. Bell at Mexico City has sent to the Automotive Division, Department of Commerce, a translation of a permit recently conceded by the Mexican Ministry of Communications and Public Works to the representative of the Cia. Mexicana de Transportes Aerea, S. A., for the establishment of an airplane service between Mexico City and points in the States of Vera Cruz and Tamaulipas. In view of similar permits ready to be granted in the near future, this one may be taken as a very good example of what parties interested in the development of commercial aviation in Mexico may expect in the way of Government permits and their conditions. It should be noted, furthermore, that this permit is not an exclusive one and does not carry the usual features of the old-time "concession."

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Honduras—The Young Men's Club, which is interested in the advance of aviation in the country, is about to order airplanes from Italy for the equipment of the first Honduran school of aviation.

Where to Fly

CALIFORNIA
SAN FRANCISCO, CALIFORNIA
EARL P. COOPER AIRPLANE & MOTOR CO.

ILLINOIS
PARTRIDGE, Inc.
Aeronautical Instruction
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